Overview

HP MSA 1040 Storage

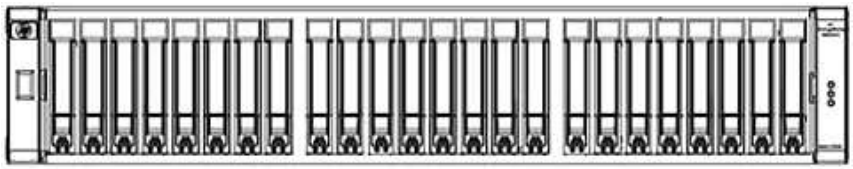
The HP MSA 1040 Storage is designed for entry-level market needs, features 8Gb Fibre Channel, 6/12 Gb SAS, and 1GbE and 10GbE iSCSI at previously unattainable entry price points. The array allows users to take advantage of the latest storage technologies in simple and efficient ways by providing a good balance between performance and budget resulting in a highly favorable $/GB return on their investment.

Entry consolidation and virtualization initiatives are now well in your budgetary reach. The MSA 1040 offers many of MSA 2040 features but at more affordable entry price point. ProLiant and BladeSystems administrators as well as IT generalists will find storage management tasks simple and intuitive with MSA.

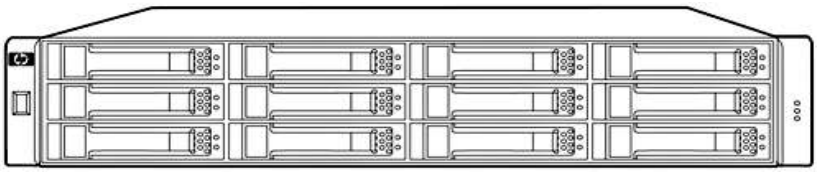
The MSA 1040 arrays leverage a new 4th-generation MSA architecture with a new processor, 2-host ports and 4GB cache per controller. Take advantage of the latest hard drive advances by choosing the form factor and technology which best meets your application and budget requirements. Unlike many competing arrays, the MSA 1040 ships standard with intuitive management tools and powerful data services such as Snapshots and Volume Copy for increased data protection.

What's New in the MSA 2000 array family?

- Introducing HP MSA 1040 2-port SAS dual controller LFF and SFF storage
- Introducing support for 12G SFF and LFF Hard Disk Drives.
  - HP MSA 1.8TB 12G SAS 10K SFF (2.5in) 512e Enterprise 3yr Warranty Hard Drive
  - HP MSA 1TB 12G SAS 7.2K SFF (2.5in) 512e Midline 1yr Warranty Hard Drive
  - HP MSA 2TB 12G SAS 7.2K SFF (2.5in) 512e Midline 1yr Warranty Hard Drive
  - HP MSA 8TB 12G SAS 7.2K LFF (3.5in) 512e Midline 1yr Warranty Hard Drive

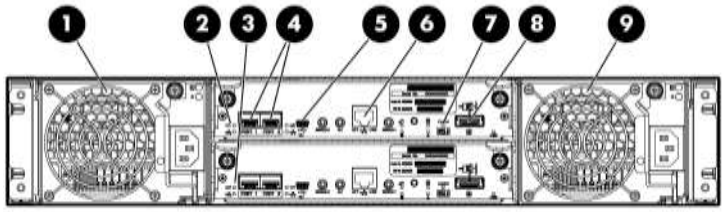


HP MSA 1040 Storage (SFF)



HP MSA 1040 Storage (LFF)

Overview



MSA 1040, shown with 2 controllers installed

1. Power supply 1
2. Controller Module A
3. Controller Module B
4. CLI Port (mini USB)
5. CLI Port (mini USB)
6. Network Management Port
7. Cache Status LED
8. SAS Expansion Port
9. Power Supply

Models

HP MSA 1040 Storage Models	**MSA 1040 Pre-Configured Models:**	
	HP MSA 1040 2-port Fibre Channel Dual Controller LFF Storage[1]	E7V99A
	HP MSA 1040 2-port Fibre Channel Dual Controller SFF Storage[2]	E7W00A
	HP MSA 1040 2-port SAS Dual Controller LFF Storage[3]	K2Q90A
	HP MSA 1040 2-port SAS Dual Controller SFF Storage[4]	K2Q89A
	HP MSA 1040 2-port 1GbE iSCSI Dual Controller LFF Storage[5]	E7W01A
	HP MSA 1040 2-port 1GbE iSCSI Dual Controller SFF Storage[6]	E7W02A
	HP MSA 1040 2-port 10GbE Dual Controller LFF Storage[7]	E7W03A
	HP MSA 1040 2-port 10GbE Dual Controller SFF Storage [8]	E7W04A

[1] Includes LFF Array Chassis + two MSA 1040 FC 2-port controllers, SFPs installed, drives not included

[2] Includes SFF Array Chassis + two MSA 1040 FC 2-port controllers, SFPs installed, drives not included

[3] Includes LFF Array Chassis + two MSA 1040 SAS 2-port controllers, drives not included

[4] Includes SFF Array Chassis + two MSA 1040 SAS 2-port controllers, drives not included

[5] Includes LFF Array Chassis + two MSA 1040 1GbE 2-port controllers, SFPs installed, drives not included

[6] Includes SFF Array Chassis + two MSA 1040 1GbE 2-port controllers, SFPs installed, drives not included

[7] Includes LFF Array Chassis + two MSA 1040 10GbE 2-port controllers, SFPs installed, drives not included

[8] Includes SFF Array Chassis + two MSA 1040 10GbE 2-port controllers, SFPs installed, drives not included

Features

All MSA 1040 models offer a common set of valuable features:

- Ease of management featuring browser-based out-of-band access. This allows a department or small company to effectively handle growing storage requirements, with the aid of an intuitive GUI to administer the unit with a minimum of complexity. Ideal for local or remote installations.
- Storage Management Utility V3 (SMU). This new MSA management GUI brings a new modern look and feel to array management. SMU V3 is available with GL200 firmware or newer. Existing MSA customers can choose to use the new SMU (V3) or to continue to use the previous generation SMU (V2) if new virtualization features are not required.
- Thin Provisioning allows storage allocation of physical storage resources only when they are consumed by an application. Thin Provisioning also allows over-provisioning of physical storage pool resources allowing ease of growth for volumes without predicting storage capacity upfront. Thin Provisioning is available with GL200 firmware or newer.
- MSA 1040 comes standard with 64 controller-based snapshots and clone capability (volume copy is only available on linear storage). There is also an optional license for 512 snapshots.
- Dual controller array models with automated failover for high availability.
- All models support a wide variety of drives: High-performance enterprise-class SAS, and high-capacity SAS Midline drives.
- The MSA 1040 will support a maximum of 3 disk enclosures (either LFF and/or SFF); Add-on enclosures can either be D2700 Small Form Factor (SFF) Drive Enclosures or MSA 2040 Large Form Factor (LFF) Disk Enclosures. The array can grow incrementally from a few drives to 48 LFF or 99 SFF drives.
- Disk Groups support RAID levels 1, 5, 6, 10. Linear Vdisks support RAID levels 0,1, 3, 5, 6, 10, 50.
- Maximum hard drive counts vary by RAID levels: 2 drive max for RAID level 1; max of 16 drives for RAID levels 0, 3, 5, 6, and 10; max of 32 drives for RAID level 50. With GL200 or newer firmware and the purchases virtualization license multiple Disk Groups can be aggregated into a Storage Pool.
- The maximum LUN size is 128TB
- Storage Pools allow data on a given LUN to span across all drives in a pool. When capacity is added to a system, the user is also getting a performance benefit of the additional spindles – hence the term Wide Striping Storage Pools are available with GL200 firmware or newer and the purchased separately Virtualization license.
- Snapshot enhancements for virtual storage, including performance improvements, hierarchical snapshots, and simplified resource management. With GL200 or newer firmware and the purchases Virtualization license
- Non-disruptive on-line controller code upgrade (requires dual controllers w/ multi-pathing software)
- Upgradable by design. Owners of a P2000 G3 array are able to do data-in-place upgrades to the new MSA 1040 array. This unique ability protects the earlier investments in drives, and JBODs. (Note: Certain limitations are applicable- please review MSA 1040-2040 Upgrade Technical Whitepaper before upgrading your P2000 G3 systems) http://www8.hp.com/h20195/v2/GetDocument.aspx?docname=4AA4-6830ENW

Follow us on twitter and be a part of the conversation, and get the latest MSA related news and information at: http://www.twitter.com/MSAstorage

Features

Application Solutions

The HP MSA 1040 Storage is the ideal solution for customers running Oracle, Microsoft, SAP environments and those customers who are deploying virtual server technologies like VMware, Hyper-V. The MSA 1040 delivers enterprise functionality that enhances virtual environments, simplifies management, and reduces costs. Easy to deploy, scale and maintain, HP MSA 1040 Arrays ensure that crucial business data remains available.

HP has developed best-in-class expertise in Oracle, Microsoft, SAP, and Virtualization Hypervisor technology through extensive testing with the HP MSA 1040, HP servers, and management software; high availability and disaster recovery solutions; and backup and recovery on the Oracle, Microsoft, and SAP application platforms. As a result, our customers can expect a wide range of operational and business benefits where they can:

- Deploy IT assets across multiple locations.
- Incrementally grow storage without interruption.
- Enable high availability and disaster recovery capabilities for critical applications.
- Deploy a remote disaster recovery site.

Learn more

To learn more about specific HP Storage Solutions that are built with Oracle, Microsoft, SAP and Virtualization environments in mind, visit the solution sites supporting each of these applications.
HP MSA Storage hyperlink to: http://www.hp.com/go/MSA
HP Storage for Oracle hyperlink to: http://www.hp.com/storage/oracle
HP Storage for Microsoft hyperlink to: http://www.hp.com/storage/microsoft
HP Storage for SAP hyperlink to: http://www.hp.com/storage/sap
HP Storage for VMware hyperlink to: http://www.hp.com/go/vmware/storage

Family Information

	MSA 1040
Capacity Single Enclosure and Maximum Additional Drive Enclosures	**LFF**: 96 TB (single LFF array-head -using 12 x 8TB LFF SAS MDL drives) 384 TB (by adding 3 LFF Disk Enclosures behind LFF Array & using 8TB LFF SAS MDL drives) **SFF**: 43 TB (single SFF array-head - using 24 x 1.8TB SFF SAS drives) 178 TB (by adding 3 SFF Disk Enclosures behind SFF Array & using 1.8TB SFF SAS drives) **NOTE:** 1) maximum available storage capacity depends on the RAID level being implemented 2) In a virtualized architecture, each storage pool has a physical capacity limit of 154TB. And each controller can have only one storage pool
Controller Cache	4 GB per controller
Total LUNs (LUN size are dependent of the storage architecture: Linear vs. Virtualized)	512 maximum LUN size: 128TB Thin Provisioning allows you to create the LUNs independent of the physical storage
Host Interconnect	2 x 8Gb Fibre Channel ports per controller 2 x 1GbE RJ-45 ports per controller 2 x 10GbE ports per controller
Maximum Drives w/ 3 expansion	48 LFF/99 SFF
Maximum Host Supported	64 in v2 UI 512 in v3 UI
Standard Software	Snapshots (64)
Optional Software	Remote Snap (linear storage only) Max Snapshot (512)

Product Technology

MSA 1040 Models

MSA 1040 Storage offers 4 factory configured models:
MSA 1040 8Gb FC with 2-ports per controller
MSA 1040 12Gb SAS with 2-ports per controller
MSA 1040 1GbE iSCSI with 2-ports per controller
MSA 1040 10GbE iSCSI with 2-ports per controller

Modular Chassis

2U rack height. 12 Large Form Factor or 24 Small Form Factor drive bays, accommodating SAS and SAS MDL Drives

Optional Disk Enclosures

Users have a choice of chassis for the array head between LFF and SFF drives. Additionally, users can choose between disk enclosures accommodating either drive sizes. Both the MSA 2040 disk enclosure and the D2700 disk enclosure can be hot-added to an operating array.

MSA 2040 3.5-inch Disk Enclosure. This 2U unit has twelve LFF (3.5-inch) drive bays and accepts for MSA dual-ported SAS and SAS MDL drives. Each pre-configured HP MSA 2040 LFF Disk Enclosure (C8R18A) has two I/O modules.

- This 3.5-inch MSA disk enclosure can be attached to either an MSA 1040 LFF or SFF array

head.

- Each disk enclosure ships standard with two .5m mini-SAS to mini-SAS cables for cascading to other disk enclosures
- Up to three MSA 2040 3.5-inch disk enclosures can be attached to an MSA 1040 Array.

D2700 2.5-inch Disk Enclosure. This 2U storage enclosure (AJ941A) is designed to support twenty five HP Storage or ProLiant 2.5-inch SFF 6Gb SAS or SAS MDL hard drives. It ships standard with dual I/O modules installed.

- This 2.5-inch D2700 disk enclosure can be attached to an MSA 1040 (SFF or LFF) array head
- The D2700 enclosure ships standard with two .5m mini-SAS to mini-SAS cables for cascading to other disk enclosures
- Up to three D2700 may be attached to the MSA 1040 array head, providing support for up to 99 SFF drives.

Scalability

The MSA 1040 Arrays are designed to allow an installation to begin with smaller capacity and be able to grow gradually as needed. The flexibility of SAS or SAS MDL drives technology, form factors, sizes, speeds, and costs per GB allows a system to easily fit in almost any budget.

- Large Form Factor configurations can scale up to 96 TB SAS MDL, expandable to 384 TB SAS MDL with the addition of a maximum of three MSA 2040 3.5-inch Disk Enclosures.
- Small Form Factor configurations can scale from 43 TB SAS. With the addition of three D2700 JBODs, the MSA 1040 storage can support 178 TB SAS.

Vdisks

The Vdisk nomenclature is being replaced by Disk Group. In the Linear Storage and in the SMU V2 you will see reference to Vdisk in the Virtual Storage and the SMU V3 you will see Disk Group. Vdisk and Disk Group are essentially the same. Vdisks have additional RAID types (RAID 0, 3) available only in the CLI.

Disk Group

A Disk Group is a collection of disks in a given redundancy mode (RAID 1, 5, 6, 10, 50). It is equivalent to a Vdisk in Linear Storage and utilizes the same proven fault tolerant technology used by Linear Storage. Disk Group RAID level and size can be created based on performance and/or capacity requirements. With GL200 or newer firmware multiple Disk Groups can be allocated into a Storage Pool for use with the Virtual Storage features.[9]

LUNs

The MSA 1040 arrays support 512 volumes and up to 512 snapshots in a system. All of these volumes can be mapped to LUNs. Maximum LUN sizes up to 128 TB, the LUNs size are dependent on the storage architecture: Linear vs. Virtualized. Thin Provisioning allows the user to create the LUNs independent of the physical storage.[8]

Storage Pools

The GL200 firmware or newer introduces Storage Pools – which are comprised of one or more Disk Groups. LUNs are no longer be restricted to a single Vdisk as with Linear Storage. A volume's data on a given LUN can now span all disk drives in a pool. When capacity is added to a system, users will benefit from the performance of all spindles in that pool.
Leveraging Storage Pools, the MSA 2040 supports large, flexible Volumes with sizes up to 128TB and

[9] Paid Option.

facilitates seamless capacity expansion. As volumes are expanded data automatically reflows to balance capacity utilization on all drives.[8]

RAID 0, 1, 3, 5, 6, 10, 50

In addition to the usual RAID levels, the MSA 1040 features several important additional levels. RAID 6 is the highest level of RAID protection. It allocates two sets of parity data across drives and allows simultaneous write operations. It can withstand two simultaneous drive failures without downtime or data loss. RAID 10 is mirroring and striping without parity. RAID 50 combines the block striping and parity of RAID 5 with the straight block striping of RAID 0, yielding higher performance than RAID 5 through the addition of RAID 0, particularly during writes.

Performance

The preliminary performance figures provided here are for your reference as many variables exist between array configurations, workloads, hard drive types, vdisk setup parameters and host system setup. All Performance information is measure using Linear Storage.

MSA 1040 Array Performance	HP MSA 1040 8Gb FC Controller[1]	HP MSA 1040 10GbE Controller[1]	HP MSA 1040 1GbE Controller[2]
Protocol (host connect)	8Gb Fibre Channel	10GbE iSCSI	1GbE iSCSI
MSA 1040 RAID 10 Performance Results			
Random Reads IOPS	29,400	29,200	28,900
Random Writes IOPS	19,700	19,700	18,500
Random Mix 60/40 IOPS	24,600	23,500	22,400
Sequential Reads MB/s	3,100	2,500	440
Sequential Writes MB/s	1,500	1,500	420
MSA 1040 RAID 5 Performance Results			
Random Reads IOPS	29,000	28,800	28,600
Random Writes IOPS	10,500	10,400	9,900
Random Mix 60/40 IOPS	16,000	16,000	14,900
Sequential Reads MB/s	3,100	2,500	440
Sequential Writes MB/s	2,000	1,900	430
MSA 1040 RAID 6 Performance Results			
Random Reads IOPS	29,000	28,800	28,500
Random Writes IOPS	8,200	8,100	7,300
Random Mix 60/40 IOPS	12,500	12,500	11,300
Sequential Reads MB/s	3,100	2,500	440
Sequential Writes MB/s	1,900	1,800	380

1). For MSA 1040 8Gb FC and MSA 1040 10GbE iSCSI results, 300 GB 15K SAS drives were used in a dual controller configuration of 8 vdisks consisting of twelve disks per vdisk, 3.3 TB volumes, and 2 volumes per host. 4 hosts directly attached to the HP MSA 1040 8Gb FC and MSA 1040 10GbE iSCSI arrays were used in this test configuration (results cannot be expected with a single host).

2). For the MSA 1040 1GbE iSCSI results, 146GB 15K SAS drives were used in a dual controller

configuration of 8 vdisks consisting of twelve disks per vdisk, 3.3 TB volumes, and 2 volumes per host. 4 hosts directly attached to the HP MSA 1040 1GbE iSCSI array were used in this test configuration (results cannot be expected with a single host).

NOTE: MSA 1040 tests with 1GbE iSCSI used 4 hosts directly attached to the HP MSA 1040 array.

- Sequential tests results were achieved with 256K block sizes and random tests were based on 8K block sizes.

NOTE: For sequential workloads with a queue depth greater than 1, each sequential stream is targeted to operate on a separate LBA range. Other types of sequential workloads that target specific LBA ranges may achieve higher results.

- All Fibre Channel results were measured using 16Gb FC Host Bus Adapters running at 8Gb. All 10GbE iSCSI results were measured using 10Gb iSCSI Host Bus Adapters. All 1GbE iSCSI results were measured using 1Gb network interface controllers (NICs).

NOTE: Number and type of applications, drive type and number of drives, operating system used, and the number of hosts will affect overall performance. This table is provided strictly as a test-lab comparison.

NOTE: These numbers reflect a full array configuration with the maximum number of front-end ports, disks, and controllers. The test results shown for the HP MSA 1040 are designed to give a conservative reference point for comparisons.

Configuration and Management Tools	HP Storage Management Utility (SMU). Management access, out-of-band: WEB GUI, CLI. Interface Types: USB, 100/1000 Ethernet. Protocols Supported SNMP, SMI-S, SSL, SSH, SMTP, FTP, HTTP, Telnet
Hot Plug Expansion and Replacement Support	All MSA 1040 models support hot plug expansion and replacement of redundant controllers, enclosures, fans, power supplies, and I/O modules for simple, fast installation and maintenance. Hot add expansion of disk enclosures is also supported.
Snapshot and Clone	All MSA 1040 arrays come standard with 64 snaps, 512 snaps available. This controller based functionality offers higher levels of data protection, enables an almost instant recovery from data failure or corruption and offers alternative development testing of 'offline' production data and the ability to backup snapped/cloned data.

Overview	The MSA 1040 arrays come integrated with web browser and CLI based software for storage and RAID management, setup, configuration, and troubleshooting. This reduces the cost of ownership by reducing the training and technical expertise necessary to install and maintain your HP storage solution. The SPOCK database provides interoperability information for thousands of components and millions of component combinations. It is available to all users at: http://www.hp.com/storage/spock.
Server Compatibility **NOTE:** depends on protocol	Supports most HP ProLiant and BladeSystems including • HP ProLiant DL, ML • HP c-Class Blade Servers • Compatibility must be confirmed at: http://www.hp.com/storage/spock

Family Information

Industry Standard servers support	• Supports most multi-vendor industry standard servers. HP requires the Third-Party Server to be logo'd and listed on the Microsoft Windows Server Catalog. • Refer to the Microsoft website: http://www.microsoft.com/windows/catalog/server/ • HP recommends that the Third-Party Server Vendor is an active member of TSANet. Refer to the TSANet website for details: www.tsanet.com • Non-HP servers will generally be supported if the HP storage stack is used. This includes supported HP branded HBAs and drivers, and supported FC switches.
OS Support	Refer to the HP support statements for complete current OS version support: http://www.hp.com/storage/spock • Microsoft Windows Server 2012 • Microsoft Windows Server 2008 R2 • VMware • HP-UX • Red Hat Linux • SuSE SLES
Web Browser support	• The MSA 1040 supports target based management, and includes a Web interface and a telnet interface, and require a web browser for management. • Beginning with GL200 or newer firmware, MSA 1040 customers have the option to use one of two WBI´s. • Users taking advantage of virtualization features will be required to use SMU V3. • The MSA 1040 requires Microsoft Internet Explorer, Mozilla Firefox, and Google Chrome.
HP StoreFront Manager for Microsoft	HP StoreFront Manager for Microsoft enables management and monitoring of HP MSA Storage running in Microsoft Hyper-V environment with a single pane-of-glass view to events/alerts, capacity and health dashboards and detailed virtual infrastructure information. It integrates seamlessly with Microsoft System Center Operations Manager (SCOM) and provides Microsoft administrators the following: It supports heterogeneous HP Storage environment including MSA 2040, 1040, HP StoreVirtual, HP 3PAR StoreServ, HP StoreOnce, HP StoreEasy, HP XP, HP EVA and HP StoreEver Storage. When deployed with the MSA 2040 array, HP StoreFront Manager provides the following: • Monitors the health, events and alerts for the MSA 2040/1040 – Linear and virtual Pools, and volumes • Provides detailed information on the VMs provisioned through MSA Storage • Effortless installation and configuration using Powershell HP StoreFront Manager for Microsoft for MSA Storage is downloadable from Software Depot: https://h20392.www2.hp.com/portal/swdepot/displayProductInfo.do?productNumber=System_Center

Optional Software

HP MSA 1040 Advanced Virtualized Features

A Virtualized Storage array is an extension to the Linear Storage building blocks (Vdisks)

Data is virtualized not only across a single Vdisk, as in Linear implementation, but also across multiple Disk Groups and additionally now across multiple Tiers of storage with different performance capabilities.

No new MSA 1040 hardware is required to take advantage of Virtualized Storage features

HP MSA 1040 Adv Virtualized Upg LTU	D4T78A
HP MSA 1040 Adv Virtualized Upg E-LTU	D4T78AAE

HP OneView for VMware vCenter

HP OneView for VMware vCenter

HP OneView for VMware vCenter is a component within the HP OneView plug-in for vCenter. It provides VMware administrators that are using VMware's vSphere management console (vCenter) with the ability to see how virtual machines are mapped to datastores and individual MSA Storage volumes. By providing these clear relationships between VM's, datastores and storage, the VMware administrator's productivity increases, as does the ability to ensure quality of service. Roles for administrators can be defined on an individual basis, providing the ability to apply specific permissions for both view and control functions.

HP OneView for VMware vCenter supports mixed array environments including MSA Storage, P2000, EVA, StoreVirtual Appliances, and the XP array series including the P9500.

When deployed with the MSA Storage array, HP OneView for VMware vCenter provides the following:

- Active Management functionality for the MSA 1040 array:
  - Create/Expand/Delete a Datastore
  - Create a Virtual Machine from a template
  - VMClone for linear storage
- Monitors the health and status of the MSA 1040
- Displays LUN / volume connections from VMs and ESX servers to the arrays and provides the location and attributes of the MSA 1040 within the SAN
- Identifies what storage features are available to allow administrators to match the features available on the MSA 1040 to their requirements
- Provide a cluster-level view of the storage

HP OneView for VMware vCenter is downloadable from Software Depot:
https://h20392.www2.hp.com/portal/swdepot/displayProductInfo.do?productNumber=HPVPR

For complete software requirements and compatibility lists, refer to the product documentation below and the HP SPOCK website: http://www.hp.com/storage/spock

For more information on HP Insight Control Storage Module for vCenter visit: www.hp.com/go/vmware

Optional Software

vStorage API for Array Integration (VAAI)

The vStorage API for Array Integration (VAAI) is one of the storage application programming interface (API) sets in vSphere. VAAI is an API storage partners can leverage to enhance performance of virtual machine (VM) management operations by delegating these operations to the storage array. With hardware offload, ESX/ESXi hosts perform certain operations faster and consume less server CPU and memory resources, and also storage port and storage fabric bandwidth. VAAI includes high performance and scalable VM data path primitives.

Storage Hardware Primitives for VAAI

- Full Copy or Hardware Assisted Move
- Block Zeroing or Hardware Assisted Zeroing
- Hardware Assisted Locking or Atomic Test and Set (ATS)

Snapshot and Volume Copy Software for the MSA 1040

Product Features

Data Protection

- Snapshots create up to 512 point-in-time pictures of data
- Volume Copies create up to 128 point-in-time copies of data
- Recovery is instant - revert data from any previous Snapshot or Volume Copy (only available on linear storage).
- Backup 'snapped' data to disk, virtual tape, or physical tape without a backup window
- A 64 snapshot license and Volume Copy are included with all MSA 1040 models.
- Support and updates are desired for bundled software functionalities (such as 64 LTU Snap and/or Volume Copy etc. in the MSA 1040 products) a combination HW + SW support care pack must be purchased.
- HP does not provide warranty assistance for software products included with our base hardware products. This would either be SupportPlus or SupportPlus24. The hardware warranty component of these services is accounted for in the pricing of the SP and SP24 care packs.

Data Testing

- Snap or clone data to test the performance of a software application on 'offline' production data.
- Snap or clone data to test how a software patch or enhancement will function on 'offline' production data.

MSA 1040 Snapshot and Clone:
All MSA 1040 models come STANDARD with 64 snapshots and Volume Copy software.
512 Snapshot option is also available for additional cost.

HP MSA 512-Snapshot Software LTU	TC462A
HP MSA 512-Snapshot Software E-LTU	TC462AAE

HP MSA Remote Snap Software

- HP MSA Remote Snap Software is only available with Linear Storage
- HP MSA Remote Snap Software is array based software that provides remote replication on the HP MSA 1040 Array products. HP Remote Snap is a form of asynchronous replication which consists of replication of block-level data from a volume on a local system to a volume that may be on the same system or on a second independent system. This second system may be collocated with the first system or may be located at a

remote site.

- HP Remote Snap functionality is based on existing Snapshot technology offered by HP MSA SAN Array products. Snapshots are used to track the data to be replicated as well as to determine the differences in data updated on the master volume, minimizing the amount of data to be transferred.
- HP Remote Snap replication technology provides the ability to accomplish key data management and protection capabilities. First, because Remote Snap uses snapshots as the underlying technology it creates multiple local recovery points which can be used for such tasks as to complement daily backups; second, replication provides the ability to access data in a remote site which could be used for dispersed operations; and third but definitely not least important replication allows for business continuance in the event of a failure on the primary site.
- In order to perform a replication, a snapshot of the volume to be replicated is taken, creating a point-in-time image of the data. This point-in-time image is then replicated to the destination volume by copying the data represented by the snapshot via a transport medium such as TCP/IP (iSCSI) or Fibre Channel. The amount of data transferred is minimized though the use of snapshots whenever possible.

HP MSA Remote Snap Software LTU	TC463A
HP MSA Remote Snap Software E-LTU	TC463AAE

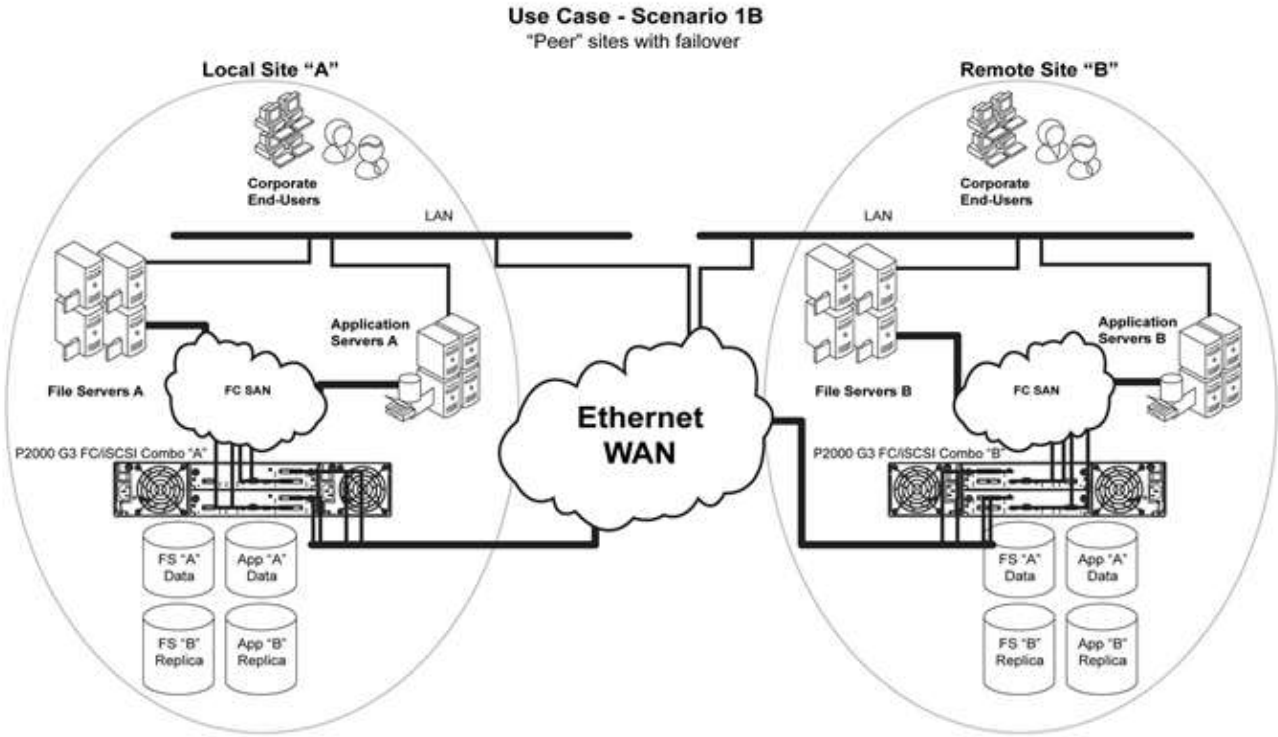
(**NOTE:** One license per array is required for replication. For example, if you have two MSA arrays performing replication (from Primary system to Remote System), you will need 2 licenses).

Product Features

- Storage based asynchronous snapshot replication
- Initial copy of data can be performed locally, reducing burden on wide area networks
- Support of both Ethernet and Fiber Channel interconnects provides flexible options to the application environments.
- Snapshot based replication technology means only changed data will be replicated to alternate site
- Many to 1 replication (up to 4 nodes) - primary use case is to replicate from "many" branch offices to the home office for the purpose of backing up data from the branches
- Single controller to single controller replication
- Advanced scheduler provides several options to IT administrators for business continuance
- Flexible architecture allows remote replication between MSA 1040 and/or MSA 2040/ P2000 G3 supported arrays. Protects existing investments and enhances business continuity planning objectives.
- Replication Wizard simplifies the task of setting up and establishing replication pairs from one unified, easy to use GUI.
- Snapshot based replication enables both local and remote recovery depending on the need. Snapshot replication isolates problems to a specific point in time which can be selected by the administrator. Additionally snapshot replication supports longer distance replication.
- Multiple relationships provide greater storage flexibility and utilization.
- Bundled 64 Snapshots and Volume Copy integration provides better efficiencies by combining the management and array technologies to create local copies.
- Fast application recovery with minimal or no transaction loss
- Creation of disaster tolerant copies of your critical business data

No-single-point-of-failure solution to increase the availability of your customers data

Optional Software



Customer Benefits

Disaster Recovery

Replication technology has typically been used to address disaster recovery issues. Disaster recovery is still the driving business case behind replication. Remote replication can be implemented from the production site to one or more remote sites across a campus, across town, across a state or across the country. When a disaster strikes the primary location, the applications can be brought up at the remote site and continue processing against the replicated copies. When the primary site is back online, the replication can be reversed and when the data is resynchronized, processing can be switched back to the primary site and business can continue. In the past, if an e-mail system experienced a disaster it was an "oh well" moment. The loss of a day or more of e-mail was not considered important. Today, e-mail is a critical component of many companies' business plans and recovering e-mail after a disaster quickly and completely is required.

Maintenance

HP Remote Snap software can also be used to solve other business needs. For instance, E-mail servers may need periodic maintenance that can take hours to complete. With remote replication in place, the downtime can be minimal (as long as it takes to bring the remote peer of the primary e-mail server online). The primary server can be worked on (patches, hardware upgrades, etc.) and then brought back online and into production. A whole datacenter can be failed over to a remote site on purpose to perform maintenance on generators, air conditioning, etc. Replication can also be used to perform a datacenter move with minimal downtime (fail everything to the DR site, move the production datacenter to its new location then fail the DR site back to the new datacenter).

Storage Based

Data replication is performed at the storage subsystem controller level and is totally transparent to the host,

alleviating unnecessary host cycles to perform the data mirroring functions. Unlike a fabric based or host based solution, the storage based solution dedicates its resources to managing the replication process between arrays, with minimal impact to applications, other data or devices on the SAN.

Bi-Directional

The bidirectional HP MSA 1040 Array solution addresses the growing need among businesses to ensure continuous availability of applications that are critical to daily business operations. HP MSA 1040 enables two sites in a remote replication connection to use each other as a destination to maintain replicated copies of online data. This maximizes resource utilization while enabling business continuance, even in the event of disaster.

Disaster Tolerance

The MSA 1040 Arrays utilize snapshot data online and in real time to a remote MSA 1040 through a local or extended storage area network (SAN). Additionally, data replication can be bidirectional, meaning that a storage array can be both a source and a destination. A particular LUN can be replicated in only one direction between the two storage arrays. Write I/O data sent to the source is replicated by HP MSA 1040 Array to the destination. A pair of properly configured HP MSA 1040 arrays is a replication solution that guarantees data integrity in the event of a storage system or site failure.

First initial copy

When a DR site is initially created a initial copy of the data from the source volume to the target volume must occur. The MSA 1040 array allows this first copy to take place locally. After completion the disks can me manually moved to the remote location. Subsequent changes will only remotely copy the changed blocks.

SAN Extensions

HP MSA 1040 Array provides the capability to replicate data over direct Fibre Channel. The distances supported over dark fiber are determined by the speed of the dark fiber connection and the technology used to communicate over the dark fiber.

Path failover (MPIO)

Multipath failover (MPIO) is supported on all operating systems

HP StoreEasy 3000 Gateway Storage

Add more value to your MSA 1040 array

HP MSA combined with HP StoreEasy 3840 Gateway Storage enables you to consolidate block and file storage onto a single, high-performance system - giving your business the flexibility to meet changing business needs on-demand.

The HP StoreEasy 3840 delivers efficient, secure, and highly available file services that help address your changing file-serving needs. It reduces your cost of ownership by simplifying management, increasing resource utilization, centralizing growth, and protecting data. HP StoreEasy 3840 provides a simple and consistent experience for managing block and file storage for multiple workloads centrally.

NOTE: For more information visit: www.hp.com/go/StoreEasy

HP StoreEasy 3840 Gateway Storage	E7X03A
HP StoreEasy 3840 Gateway Storage Blade	E7X08A

Service and Support, HP Care Pack, and Warranty Information

Warranty

Three-year limited warranty, parts exchange Next Business day delivery

Enclosures, Hard drives, and Options for the MSA 1040 carry their own warranty. Refer to HP's Limited Warranty Statement for more information.

The MSA 1040 has been designed with customer self-repairable parts to minimize repair time and provide greater flexibility in performing defective parts replacement. Please refer to HP's limited warranty Statement and parts replacement instructions for further details.

http://h18006.www1.hp.com/products/storageworks/warranty.html

Products included in various kits carry their own individual warranties.

NOTE: The warranty of the hard drive options purchased with the MSA 1040 models is different for SAS hard drives versus SAS MDL. SAS hard drive options have a three year warranty and SAS MDL.

Service and Support

Services to accelerate time to results

HP Storage Services bring you a rich portfolio of consulting and support services designed to add value to our core storage products and solutions. We have the know-how and experience to put storage technology to work for you. We work closely with you as your strategic partner, leveraging our full services portfolio to make sure that everything works to optimize your enterprise.

Choose from services aligned to our storage product offerings and lifecycle. From mission-critical onsite services to innovative web-based remote support, you choose the precise level of attention and support your business demands.

Discover, plan, and design

Choose from a rich portfolio of services to make the most of HP MSA1040 Storage, so you can efficiently and affordably consolidate, manage, and extract value from unstructured data.

Start here to understand your data protection options. Next, develop a methodical plan and design the optimal HP MSA 1040 SAN Storage that addresses your unique technology requirements.

HP Backup Recovery Efficiency Analysis - Assessment of how efficiently backup components are being used as the amount of data to be backed up continues to grow exponentially via analysis intelligence and a snapshot of your current backup environment.
http://h20195.www2.hp.com/v2/GetPDF.aspx/4AA3-8490ENW.pdf

HP Backup Recovery Impact Analysis - Focus placed on service requirements and design as the key to success for gaining a clear understanding of the role of increasingly diverse data protection strategies.
http://h20195.www2.hp.com/V2/GetPDF.aspx/4AA4-1175ENW.pdf

HP Backup Recovery Modernization - Initial discovery, interviews, reference architecture design, proposal content development, vendor grading, and final recommendations carried out so as to require minimal resources and locations on your part.
http://h20195.www2.hp.com/V2/GetPDF.aspx/4AA4-1199ENW.pdf

Service and Support, HP Care Pack, and Warranty Information

Deploy and integrate

Implement HP MSA 2010 SAN Storage, correctly-right from the start-so you can count on reduced risk and accelerated deployment, while implementing a best-practice configuration from day one.

HP MSA Family Disk Array Installation and Startup Service - Implement right from the start, as HP experts install, test, and configure your hardware and software onsite. We deliver a tailored storage deployment properly integrated into your environment.
http://h20195.www2.hp.com/V2/GetPDF.aspx/4AA0-3048ENW.pdf

HP Storage Data Migration Service - End-to-end data migration service providing seamless discovery, assessment, planning, and design, completely customizable to your organization's storage area network (SAN) or network attached storage (NAS) environment and using innovative software to help you migrate to HP storage quickly and efficiently
http://h20195.www2.hp.com/V2/GetPDF.aspx/4AA3-0774ENW.pdf

HP Storage and Data Consultant Residency Services - Strategically augment your current storage and backup environment with HP resources who become your trusted advisors.
HP Proactive Select - A flexible way to purchase services to fit your environment with an extensive menu of HP Proactive Select event and technical services, such as onsite firmware upgrades, health checks, assessments, and education
http://h20195.www2.hp.com/V2/GetPDF.aspx/4AA2-3842ENW.pdf

Operate and support

Choose the right support to maximize uptime, free up your resources, and achieve improved value-as you get the most out of the existing IT assets while accelerating time-to-revenue.

HP Proactive Care Service- Hardware and software support services designed specifically for your technology with rapid access to Advanced Solution Centre Specialists plus firmware and software management and best practice advice
http://h20195.www2.hp.com/v2/GetPDF.aspx/4AA3-8855ENW.pdf

HP Foundation Care - System-level IT hardware and software support that delivers flexible coverage window and response time for more choice and simplicity.

HP Proactive Care Advanced – Building on HP Proactive Care to give you personalized technical and operational advice from an assigned local Account Support Manager for personalized technical collaboration, flexible access to specialist skills to help fine-tune business critical IT, and Enhanced Critical Incident Management to help make sure your business is not affected if you experience a system or device outage.

HP Proactive Care Personalized Support - An option-if you have HP Proactive Care- to bring increased personalization of the Proactive Care support experience through the assignment of an Account Service Manager (ASM) who provides IT best practice advice to help address IT issues and projects.
http://h20195.www2.hp.com/V2/GetPDF.aspx/4AA4-3446ENW.pdf

HP Education Services - Comprehensive training for new, as well as experienced, storage administrators designed to expand your skills and keep you up to speed with the latest storage and virtualization technology from HP Storage.
http://education.hp.com/curr-storsan.htm

Service and Support, HP Care Pack, and Warranty Information

Optimized Care- delivers best performance and stability through deployment and proactive management practices	**Choose from three levels of operate and support care** **HP 6hr CTR Proactive Care Service** **Additional options** - HP Proactive Care Personalized Support (once per Proactive Care support new environment), an additional day of HP Personalized Support, and 10 additional HP Proactive Select credits per year, per array
Standard Care-maintains high level of uptime, along with expert help to cut the cost and complexity of implementation and support	**HP Proactive Care 24x7** **Additional options** - HP Proactive Care Personalized Support (once per Proactive Care support new environment), an additional day of HP Personalized Support, and 10 additional HP Proactive Select credits per year, per array
Basic Care-Minimum recommended support	**HP Foundation Care 24x7** **Additional options** - 10 Proactive Select Credits per Year
Remote Support Automation	**HP Insight Remote Support**-Available at no additional cost to all warranty, HP Care Pack Service and service agreement customers, uses proven technology to deliver secure, reliable 24x7 remote monitoring, diagnosis and problem resolution. http://h20195.www2.hp.com/V2/GetPDF.aspx/4AA2-4676ENW.pdf http://h18004.www1.hp.com/products/servers/management/insight-remote-support/overview.html
For more information	www.hp.com/services/storage To learn more on HP Storage Services, please contact your HP sales representative or HP Authorized Channel Partner HP Care Pack Services are sold by HP and HP Authorized Service Partners: • Services for customers purchasing from HP or an enterprise reseller are quoted using HP order configuration tools. • Customers purchasing from a commercial reseller can find HP Care Pack Services at: www.hp.com/go/lookuptool

Configure to Order Program Information

HP has a very successful Configure to Order program for the MSA 1040 family. The MSA 1040 models and options may be factory installed in a rack with switches, MSA 2040 disk enclosures and hard drives. The MSA 1040 arrays may be integrated with ProLiant servers or as standalone storage.
Orders to be shipped through the CTO process must have a minimum of four drives of the same type (SAS or SAS MDL).

Step 1 - MSA 1040 - Base Configuration

Select one model:

Model Name	SKUs
HP MSA 1040 2-port Fibre Channel Dual Controller LFF Storage[10]	E7V99A
HP MSA 1040 2-port Fibre Channel Dual Controller SFF Storage[11]	E7W00A
HP MSA 1040 2-port SAS Dual Controller LFF Storage[12]	K2Q90A
HP MSA 1040 2-port SAS Dual Controller SFF Storage[13]	K2Q89A
HP MSA 1040 2-port 1GbE iSCSI Dual Controller LFF Storage[14]	E7W01A
HP MSA 1040 2-port 1GbE iSCSI Dual Controller SFF Storage[15]	E7W02A
HP MSA 1040 2-port 10GbE Dual Controller LFF Storage[16]	E7W03A
HP MSA 1040 2-port 10GbE Dual Controller SFF Storage[17]	E7W04A

Step 2 - Options

Select each option with quantities specified.

Step 2a - SAS or SAS MDL Drive Options

SKUs

HP MSA 1040 Arrays support both the HP ProLiant Server SFF Hard Disk Drives and HP MSA SFF Hard Disk Drives

NOTE: SAS MDL drives are designed for archival or reference data. They should not be used in a heavy or intense I/O environment. Those situations require the use of enterprise-class SAS drives. MSA 3.5-inch or 2.5-inch drives are for use only with MSA arrays and supported Disk Enclosures.

MSA 1040 Drives:

SAS Drives (SFF 2.5-inch)

12G SFF 15K SAS HDDs

HP MSA 300GB 12G SAS 15K SFF (2.5in) Enterprise 3yr Warranty Hard Drive	J9F40A
HP MSA 450GB 12G SAS 15K SFF (2.5in) Enterprise 3yr Warranty Hard Drive	J9F41A

[10] Includes LFF Array Chassis + two MSA 1040 FC 2-port controllers, SFPs installed, drives not included

[11] Includes SFF Array Chassis + two MSA 1040 FC 2-port controllers, SFPs installed, drives not included

[12] Includes LFF Array Chassis + two MSA 1040 SAS 2-port controllers, drives not included

[13] Includes SFF Array Chassis + two MSA 1040 SAS 2-port controllers, drives not included

[14] Includes LFF Array Chassis + two MSA 1040 1GbE 2-port controllers, SFPs installed, drives not included

[15] Includes SFF Array Chassis + two MSA 1040 1GbE 2-port controllers, SFPs installed, drives not included

[16] Includes LFF Array Chassis + two MSA 1040 10GbE 2-port controllers, SFPs installed, drives not included, direct attached copper cables are supported in 10GbE Controller systems

[17] Includes SFF Array Chassis + two MSA 1040 10GbE 2-port controllers, SFPs installed, drives not included, direct attached copper cables are supported in 10GbE Controller systems

Configuration Information

HP MSA 600GB 12G SAS 15K SFF (2.5in) Enterprise 3yr Warranty Hard Drive	J9F42A
HP MSA 146GB 6G SAS 15K SFF(2.5-inch) Dual Port Ent 3yr Warranty Hard Drive	E2D54A
HP MSA 300GB 6G SAS 15K SFF(2.5-inch) Dual Port Ent 3yr Warranty Hard Drive	C8S61A

Configuration Information

12G SFF 10K SAS HDDs

HP MSA 300GB 12G SAS 10K SFF(2.5in) Dual Port Enterprise 3yr Warranty Hard Drive	J9F44A
HP MSA 600GB 12G SAS 10K SFF(2.5in) Dual Port Enterprise 3yr Warranty Hard Drive	J9F46A
HP MSA 900GB 12G SAS 10K SFF(2.5in) Dual Port Enterprise 3yr Warranty Hard Drive	J9F47A
HP MSA 1.2TB 12G SAS 10K SFF(2.5in) Dual Port Enterprise 3yr Warranty Hard Drive	J9F48A
HP MSA 1.8TB 12G SAS 10K SFF (2.5in) 512e Enterprise 3yr Warranty Hard Drive	J9F49A

NOTE: 512e drives require MSA 1040/2040 firmware version GL200P002 or newer

6G SFF 10K SAS HDDs

HP MSA 300GB 6G SAS 10K SFF(2.5-inch) Dual Port Ent 3yr Warranty Hard Drive	E2D55A
HP MSA 450GB 6G SAS 10K SFF(2.5-inch) Dual Port Ent 3yr Warranty Hard Drive	E2D56A
HP MSA 600GB 6G SAS 10K SFF(2.5-inch) Dual Port Ent 3yr Warranty Hard Drive	C8S58A
HP MSA 900GB 6G SAS 10K SFF(2.5-inch) Dual Port Ent 3yr Warranty Hard Drive	C8S59A
HP MSA 1.2TB 6G SAS 10K SFF(2.5-inch) Dual Port Ent 3yr Warranty Hard Drive	E7W47A

12G SFF 7.2K SAS MDL HDDs

HP MSA 1TB 12G SAS 7.2K SFF (2.5in) 512e Midline 1yr Warranty Hard Drive	J9F50A
HP MSA 2TB 12G SAS 7.2K SFF (2.5in) 512e Midline 1yr Warranty Hard Drive	J9F51A

NOTE: 512e drives require MSA 1040/2040 firmware version GL200P002 or newer

6G SFF 7.2K SAS MDL HDDs

HP MSA 1TB 6G SAS 7.2K SFF (2.5-inch) Dual Port Midline 3yr Warranty Hard Drive	C8S62A

MSA Large Form Factor (LFF) SAS MDL DP drives for MSA 1040 Array and MSA 2040 3.5-inch Disk Enclosure

12G LFF 7.2K SAS Midline (MDL) HDDs

HP MSA 8TB 12G SAS 7.2K LFF (3.5in) 512e Midline 1yr Warranty Hard Drive	M0S90A
HP MSA 6TB 12G SAS 7.2K LFF(3.5in) Midline 1yr Warranty Hard Drive	J9F43A
HP MSA 4TB 12G SAS 7.2K LFF (3.5in) Midline 1yr Warranty Hard Drive	K2Q82A

NOTE: 512e drives require MSA 1040/2040 firmware version GL200P002 or newer

6G LFF 7.2K SAS Midline (MDL) HDDs

HP P2000 1TB 6G SAS 7.2K rpm LFF (3.5-inch) Dual Port MDL Hard Drive	AP861A
HP P2000 2TB 6G SAS 7.2K rpm LFF (3.5-inch) Dual Port MDL Hard Drive	AW555A
HP P2000 3TB 6G SAS 7.2K LFF (3.5- inch) Dual Port MDL 1yr Warranty Hard Drive	QK703A
HP MSA 4TB 6G SAS 7.2K rpm LFF (3.5-inch) Midline 1yr Warranty Hard Drive	C8R26A
HP MSA 6TB 6G SAS 7.2K 3.5in Midline 1yr Warranty Hard Drive	J9F36A

MSA Large Form Factor (LFF) SAS DP drives for MSA 1040 Array and MSA 2040 3.5-inch Disk Enclosure

12G LFF 15K SAS HDDs

HP MSA 300GB 12G SAS 15K LFF (3.5in) Converter Enterprise 3yr Warranty Hard Drive	J9V68A
HP MSA 450GB 12G SAS 15K LFF (3.5in) Converter Enterprise 3yr Warranty Hard Drive	J9V69A
HP MSA 600GB 12G SAS 15K LFF (3.5in) Converter Enterprise 3yr Warranty Hard Drive	J9V70A

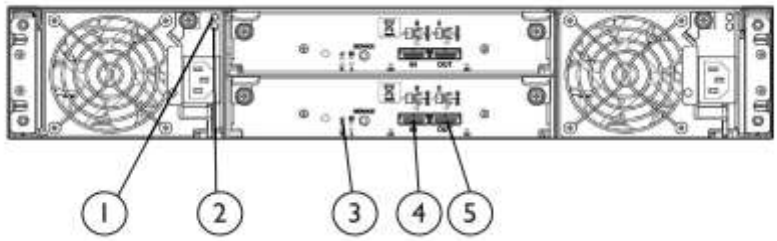
6G LFF 15K SAS HDDs

HP P2000 300GB 6G SAS 15K rpm LFF Dual Port Enterprise Hard Drive	AP858A

Configuration Information

HP P2000 450GB 6G SAS 15K rpm LFF Dual Port Enterprise Hard Drive	AP859A
HP P2000 600GB 6G SAS 15K rpm LFF Dual Port Enterprise Hard Drive	AP860A
HP ProLiant Server SAS Drives (SFF 2.5-inch):	
HP 300GB 12G SAS 15K rpm SFF (2.5-inch) Enterprise 3yr Warranty Hard Drive	785099-B21
HP 450GB 12G SAS 15K rpm SFF (2.5-inch) Enterprise 3yr Warranty Hard Drive	785101-B21
HP 600GB 12G SAS 15K rpm SFF (2.5-inch) Enterprise 3yr Warranty Hard Drive	785103-B21
HP 300GB 6G SAS 15K rpm SFF (2.5-inch) Hot Plug Enterprise 3yr Warranty Hard Drive	627117-B21
HP 146GB 6G SAS 15K rpm SFF (2.5-inch) Dual Port Enterprise 3yr Warranty Hard Drive	512547-B21
HP 300GB 6G SAS 10K rpm SFF (2.5-inch) Dual Port Enterprise 3yr Warranty Hard Drive	507127-B21
HP 450GB 6G SAS 10K rpm SFF (2.5-inch) Dual Port Enterprise 3yr Warranty Hard Drive	581284-B21
HP 900GB 6G SAS 10K rpm SFF (2.5-inch) Dual Port Enterprise 3yr Warranty Hard Drive	619291-B21
HP 1.2TB 6G SAS 10K rpm SFF (2.5-inch) Dual Port Enterprise 3yr Warranty Hard Drive	718160-B21
HP 1TB 6G SAS 7.2K rpm SFF (2.5-inch) Dual Port Midline 1yr Warranty Hard Drive	605835-B21

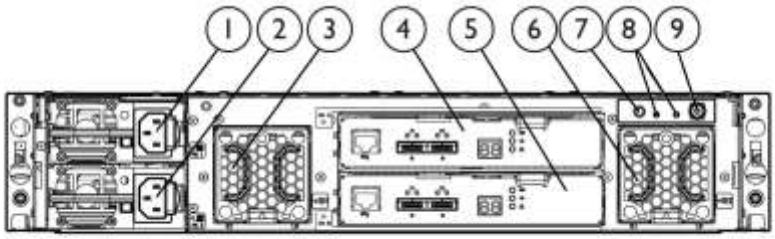
Step 2b - Drive Enclosure Options



MSA 2040 LFF Disk Enclosure

Rear Panel components

1. Power Indicator
2. Fault Indicator
3. Unit Locator
4. SAS In Port
5. SAS Out Port



HP D2700 SFF Disk Enclosure

Rear Panel components

1. Power Supply 1
2. Power Supply 2
3. Fan 1
4. I/O Module A
5. I/O Module B
6. Fan 2
7. Rear UID push button
8. Enclosure LEDs
9. Power on/standby button

Use either disk enclosure with Large or Small Form Factor, single or dual controller array heads. Each ships with two .5m mini-SAS to mini-SAS cables.

HP MSA 2040 LFF Disk Enclosure	C8R18A
HP D2700 Disk Enclosure	AJ941A

Step 2c - SAS Cable Options

miniSAS to miniSAS Cables:
Connecting MSA 1040 Controller to a disk enclosure where a longer cable is desired.

HP External Mini SAS 1m Cable ALL	407337-B21
HP External Mini SAS 2m Cable	407339-B21

Configuration Information

Step 3 - Other MSA 1040 Options

Choose optional AC Power Cords (2 required)

NOTE: Two PDU cables: one 142263-008 (Black) and one 1422633-013 (Grey), ship standard with all AC-powered enclosures.

HP ProLiant 12 ft Power Cord	227099-001
Power Cord, (Australia/China/New Zealand)	227098-001
Power Cord, (Central Europe)	157215-001
Power Cord, (United Kingdom/Hong Kong)	157216-001
Power Cord, (Switzerland)	157219-001
Power Cord, (Italy)	157217-001
Power Cord, (Denmark)	157218-001
Power Cord, (Japan)	139867-001
Power Cord, (South East Asia/India)	157220-001

Step 4a - Choose Supported Options For Fibre Channel Infrastructure

Fibre Channel Host Bus Adapters

MSA 1040 8Gb FC configurations can be connected to 16Gb FC infrastructure as switches will auto-negotiate to 8Gb speed. MSA 1040 controller do not support 16Gb FC SFPs. See MSA 2040 for native 16Gb FC connectivity.

Model	
C-class HBA	**SKUs**
HP QMH2572 8Gb Fibre Channel Host Bus Adapter for BladeSystem c-Class	651281-B21
HP LPe1205A 8Gb Fibre Channel Host Bus Adapter for BladeSystem c-Class	659818-B21
FC switches	
HP SN8000B Family (16Gb)	
HP SN3000B Fibre Channel Switch (16Gb)	
HP SN6000B Fibre Channel Switch (16Gb)	
HP StoreFabric SN6500B 16Gb 96/96 Power Pack+ FC Switch	
HP StoreFabric SN6500B 16Gb 96/96 FC Switch	
HP StoreFabric SN6500B 16Gb 96/48 Power Pack+ FC Switch	
HP StoreFabric SN6500B 16Gb 96/48 FC Switch	
BladeSystem c-Class Fibre Channel Mezzanine HBAs	
QLogic QMH2562 8Gb Fibre Channel Host Bus Adapter for c-Class BladeSystem	451871-B21
Emulex LPe1205 8Gb Fibre Channel Host Bus Adapter for c-Class BladeSystem	456972-B21
Fibre Channel HBAs	
NOTE: Please visit www.hp.com/go/fchba for product details and www.hp.com/storage/spock for compatibility details.	
Emulex Fibre Channel HBAs	
HP 81E 8Gb 1-port PCIe Fibre Channel Host Bus Adapter	AJ762B
HP 82E 8Gb 2-port PCIe Fibre Channel Host Bus Adapter	AJ763B

Configuration Information

	QLogic Fibre Channel HBAs	
	HP 81Q 8Gb 1-port PCIe Fibre Channel Host Bus Adapter	AK344A
	HP 82Q 8Gb 2-port PCIe Fibre Channel Host Bus Adapter	AJ764A
Fibre Channel Switches	HP 8/20q Fibre Channel 8-ports Active Switch	AQ233B
	HP 8/20q Fibre Channel Switch	AK242B
	HP 8/8 Base (0) e-port SAN Switch	AM866B
	HP 8/8 (8) Full Fabric Ports Enabled SAN Switch	AM867B
	HP 8/24 Base (16) Full Fabric Ports Enabled SAN Switch	AM868B
	HP 1606 FCIP 16-pt Enabled 8Gb FC 6-pt Enabled 1GbE Power Pack+ Switch	AP864B
	HP 1606 FCIP 16-pt Enabled 8Gb FC 6-pt Enabled 1GbE Full Switch	AP863B
	HP 1606 FCIP 4-pt Enabled 8Gb FC 2-pt Enabled 1GbE Base Switch	AP862B
	Brocade 8/12c SAN Switch for BladeSystem c-Class	AJ820B
	Brocade 8/24c SAN Switch for BladeSystem c-Class	AJ821B
	Brocade 8/24c Power Pack+ SAN Switch for BladeSystem c-Class	AJ822B
	HP SN6000 Stackable 8Gb 24-port Single Power Fibre Channel Switch[18]	AW575B
	HP SN6000 Stackable 8Gb 24-port Dual Power Fibre Channel Switch[14]	AW576B
	HP SN6000 Stackable 12-port Single Power FC Switch[19]	BK780B
	Cisco MDS 9124 8-ports Active Fabric Switch	AG646A
	Cisco MDS 9124 16-ports Active Fabric Switch	AG647A
	HP MDS 9124 24-ports Active Fabric Switch	AG648A
	Cisco MDS 8/12c Fabric Switch for HP BladeSystem c-Class	AW563A
	Cisco MDS 8/24c Fabric Switch for HP BladeSystem c-Class	AW564A
	Cisco MDS 9222i Multiservice with 0 SFP Transceiver Modular Fabric Switch	AG851B
	HP SN6000C 8Gb 16-port Fibre Channel Switch	AW585A
	HP SN6000C 8Gb 32-port Fibre Channel Switch	AW586A
PremierFlexOM4 type cables	HP Premier Flex LC/LC Multi-mode OM4 2 fiber 1m Cable	QK732A
	HP Premier Flex LC/LC Multi-mode OM4 2 fiber 2m Cable	QK733A
	HP Premier Flex LC/LC Multi-mode OM4 2 fiber 5m Cable	QK734A
	HP Premier Flex LC/LC Multi-mode OM4 2 fiber 15m Cable	QK735A
	HP Premier Flex LC/LC Multi-mode OM4 2 fiber 30m Cable	QK736A
	HP Premier Flex LC/LC Multi-mode OM4 2 fiber 50m Cable	QK737A

[18] 20 device ports active/4 stacking (ISL) ports active

[19] 8 device ports/4 stacking (ISL) ports active, upgradeable to 20 device ports active

Configuration Information

OM3 FC LC-LC cables	HP LC to LC Multi-mode OM3 2-Fiber 0.5m 1-Pack Fiber Optic Cable	AJ833A
	HP LC to LC Multi-mode OM3 2-Fiber 1.0m 1-Pack Fiber Optic Cable	AJ834A
	HP LC to LC Multi-mode OM3 2-Fiber 2.0m 1-Pack Fiber Optic Cable	AJ835A
	HP LC to LC Multi-mode OM3 2-Fiber 5.0m 1-Pack Fiber Optic Cable	AJ836A
	HP LC to LC Multi-mode OM3 2-Fiber 15.0m 1-Pack Fiber Optic Cable	AJ837A
	HP LC to LC Multi-mode OM3 2-Fiber 30.0m 1-Pack Fiber Optic Cable	AJ838A
	HP LC to LC Multi-mode OM3 2-Fiber 50.0m 1-Pack Fiber Optic Cable	AJ839A

Supported options

Mini-SAS HD to Mini-SAS Fanout Cables

HP Mini SAS High Density to Dual 2-lane Mini SAS External Fanout 1 Meter Cable	K2R02A
HP Mini SAS High Density to Dual 2-lane Mini SAS External Fanout 2 Meter Cable	K2R03A
HP Mini SAS High Density to Dual 2-lane Mini SAS External Fanout 4 Meter Cable	K2R04A

Note: Recommended to utilize Fanout cables when connecting to SAS HBAs for maximum future flexibility without downtime. The Fanout cables are not supported on the MSA 2040

Mini-SAS HD to Mini-SAS HD Fanout Cables

HP Mini SAS High Density to Dual 2-lane Mini SAS High Density External Fanout 1 Meter Cable	K2Q99A
HP Mini SAS High Density to Dual 2-lane Mini SAS High Density External Fanout 2 Meter Cable	K2R00A
HP Mini SAS High Density to Dual 2-lane Mini SAS High Density External Fanout 4 Meter Cable	K2R01A

Note: Recommended to utilize Fanout cables when connecting to SAS HBAs for maximum future flexibility without downtime. The Fanout cables are not supported on the MSA 2040

Mini-SAS HD to Mini-SAS Cables

HP 1.0m External Mini-SAS High Density to Mini-SAS Cable[20]	716189-B21
HP 2.0m External Mini SAS High Density to Mini SAS Cable	716191-B21
HP 4.0m External Mini SAS High Density to Mini SAS Cable	716193-B21

Note: Recommended to utilize standard cable when connecting to Blade enclosure switches

Mini-SAS HD to Mini-SAS HD Cables

HP External 1.0m (3ft) Mini-SAS HD 4x to Mini-SAS HD 4x Cable	716195-B21
HP External 2.0m (6ft) Mini-SAS HD 4x to Mini-SAS HD 4x Cable	716197-B21
HP External 4.0m (13ft) Mini-SAS HD 4x to Mini-SAS HD 4x Cable	716199-B21

SAS Host Bus Adapters (HBAs)

HP H241 12Gb 2-ports Ext Smart Host Bus Adapter	726911-B21
HP H221 PCIe 3.0 SAS Host Bus Adapter	729552-B21
HP H221 Host Bus Adapter	650931-B21
HP Modular Smart Array SC08e 2-ports Ext PCIe x8 SAS Host Bus Adapter	614988-B21

[20] This cable is used to connect 6Gb SAS initiator to MSA 2040 SAS controller. This is not used for connecting to a disk enclosure.

	SAS Controllers	
	HP Smart Array P741m/2GB FBWC 12Gb 4-ports Ext Mezzanine SAS Controller	726782-B21
	HP Smart Array P731m/512 FBWC 6Gb 4-ports Ext Mezzanine SAS Controller	698536-B21
	HP Smart Array P721m/2G FBWC 4-ports Ext Mezzanine SAS Controller	650072-B21
	HP Smart Array P721m/512 4-ports Ext Mezzanine SAS Controller	655636-B21
	HP Smart Array P712m/256 6Gb 2-ports Int/2-ports Ext Mezzanine SAS Controller	488348-B21
	HP Smart Array P711m/1G 6Gb FBWC 4-ports Ext Mezzanine SAS Controller	513778-B21
	HP Smart Array P441/4GB FBWC 12Gb 2-ports Ext SAS Controller	726825-B21
	HP Smart Array P431/2GB FBWC 12Gb 2-ports Ext SAS Controller	698531-B21
	Switches	
	HP 6Gb SAS Switch Single Pack for HP BladeSystem c-Class	BK763A
	HP 6Gb SAS Switch Dual Pack for HP BladeSystem c-Class	BK764A

Step 4c - Choose Supported Options For 10GbE Infrastructure

- Verify that the cable/transceiver is supported with the connecting device (i.e. switch or NIC/iSCSI HBA)

NOTE: Direct attached copper cables are supported in 10GbE Controller systems

Copper Cable	HP BladeSystem c-Class 10GbE SFP+ to SFP+ 0.5m Direct Attach Copper Cable	487649-B21
	HP BladeSystem c-Class 10GbE SFP+ to SFP+ 1m Direct Attach Copper Cable	487652-B21
	HP BladeSystem c-Class 10GbE SFP+ to SFP+ 3m Direct Attach Copper Cable	487655-B21
	HP BladeSystem c-Class 10GbE SFP+ to SFP+ 5m Direct Attach Copper Cable	537963-B21
	HP BladeSystem c-Class 10GbE SFP+ to SFP+ 7m Direct Attach Copper Cable	487658-B21
DAC Cable	HP X242 10G SFP+ to SFP+ 1m Direct Attach Copper Cable	J9281B
	HP X242 10G SFP+ to SFP+ 3m Direct Attach Copper Cable	J9283B
	HP X242 10G SFP+ to SFP+ 7m Direct Attach Copper Cable	J9285B
	HP X240 10G SFP+ to SFP+ 0.65m Direct Attach Copper Cable	JD095C
	HP X240 10G SFP+ to SFP+ 1.2m Direct Attach Copper Cable	JD096C
	HP X240 10G SFP+ to SFP+ 3m Direct Attach Copper Cable	JD097C
	HP X240 10G SFP+ to SFP+ 5m Direct Attach Copper Cable	JG081C
	HP X240 10G SFP+ SFP+ 7m Direct Attach Copper Cable	JC784C
iSCSI Adapters	**NOTE:** OS Specific software iSCSI initiators are supported on NICs which conform to the IEEE Ethernet Standards. Review SPOCK for any changes to the hardware iSCSI adapters which are supported: http://www.hp.com/storage/spock	

Step 5 - Choose Rack Options

Please refer to the HP Infrastructure products page for more information on HP racks and rack options or the HP 10000 G2 Series Rack QuickSpec.

http://h18004.www1.hp.com/products/servers/platforms/rackandpower.html

http://h18000.www1.hp.com/products/quickspecs/12402_div/12402_div.html

Step 6 – Services (Software Support)

MSA 1040 Advanced Virtualization Functionality

The MSA advanced virtualization functionalities are available for new and existing MSA 1040 owners via firmware update. (Thin Provisioning, Archive Tiering capability, Redirect on Write Snapshot capability and Wide Striping).

NOTE: MSA advanced virtualization functionality Upg (upgrade) is a paid option for the MSA 1040.

HP MSA 1040 Adv Virtualized Upg LTU	D4T78A
HP MSA 1040 Adv Virtualized Upg E-LTU	D4T78AAE
HP MSA 512-Snapshot Software LTU	TC462A
HP MSA 512-Snapshot Software E-LTU	TC462AAE
HP MSA Remote Snap Software LTU	TC463A
HP MSA Remote Snap Software E-LTU	TC463AAE

MSA 1040	**POWER REQUIREMENTS**	
	Input Power Requirements (typical-running I/O) SFF/LFF arrays	110VAC 3.20A, 343W; 220VAC 1.67A,337W
	Max Input Power	100-240 VAC, 50/60 Hz., 4.20-1.77A
	Heat Dissipation	1174 BTU/hr
	TEMPERATURE AND HUMIDITY RANGES	
	Operating Temperature	41°F to 104°F (5°C to 40°C)
	Shipping Temperature	-40°F to 158°F (-40°C to 70°C)
	Operating Humidity	10% to 90% RH @ 104°F (40°C) non-condensing
	Non-Operating Humidity	Up to 93% RH @ 104°F (40°C)
	DECLARED ACOUSTIC NOISE LEVELS	
	Sound Power	A weighted sound power LWAd=6,75 B
	Sound Pressure	A weighted sound pressure LpAm - 55dB
	SHOCK AND VIBRATION	
	Shock, Operational	3G's for 11 milliseconds
	Shock, Non-Operational	Per NEBS GR-63-CORE UNPACKAGED EQUIPMENT SHOCK CRITERIA (4.3.2)
	Vibration, Operational	5-500Hz, 0.14 Grms shaped
	Vibration, Non-Operational	3-365-3Hz, 1.22 Grms,z-axis,0.85 Grms, X&Y axis shaped spectrum
	PHYSICAL	
	Height	3.5 in/ 8.9 cm
	Depth (excluding cables) (back of ear to back of controller handle)	MSA 1040 SFF 24-bay array: 19.5 in / 49.5 cm MSA 1040 LFF 12-bay array: 22.5in. / 57.2 cm
	Width (body only)	17.6 in / 44.7 cm (w/ ears 19 in / 48.26 cm)
	Chassis Weight (no controllers)	MSA 1040 LFF chassis: 31 lbs. (DC-pwr model: 32.6 lbs) MSA 1040 SFF chassis: 29.1 lbs (DC-pwr model: 30.7lbs)

MSA 1040 Controllers:	**User Interface**	Status and activity provided via management interfaces. Status Indicators on front of Controller
	RAID Support	0, 1, 3, 5, 6, 10, 50
	Cache Memory	4GB Read/Write. ECC protection with backup to Flash memory (indefinite backup)
	Cache Backup	ECC protection with back up to flash memory (indefinite backup)
	Upgradeable Firmware	yes
	Disk Drive and Enclosure Protocol Support	6 Gb SAS - Serial Attached SCSI
	Host Ports	2 x 8Gb Fibre Channel per controller 2 x 1GbE iSCSI per controller

Technical Specifications

		2 x 10GbE iSCSI per controller
	Expansion Port	SAS (SFF8088) 4x lane 6 Gb SAS
	Weight, controller	MSA 1040 Controllers 4.8 lbs.

MSA 1040 Regulatory Info	**Safety**	UL 60950-1 (USA)
		CAN/CSA-C22.2 No.60950-1-03 (Canada)
		EN 60950-1 (European Union)
		GS mark (Germany)
		IEC 60950-1 (International)
		CCC Mark (power supply only, China PRC)
	Electromagnetic Compatibility	VCCI:2008-04 Class A (Japan)
		FCC 15:109(g) Class A (USA)
		ICES-003:2004 Class A (Canada)
		EN55022 : (European Union Class A); CISPR 22 (International Class A)
		EN61000-3-2 : (Harmonics) (European Union)
		EN61000-3-3 : (Flicker) (European Union)
		EN 55024 (European Union, Immunity, Class A);CISPR 24 (International Immunity, Class A)
		AS/NZS CISPR 22, Class A (Australia, New Zealand)
		CNS 13438 Taiwan, Class A (Taiwan)
		KN22 Class A (Emissions Class A); KN24 (Immunity) (S Korea)
	RoHS and WEEE	RoHS-6/6 Compliance, China RoHS, WEEE
	Country Approvals	United States ,Australia/New Zealand, Canada, China (PRC), European Union, Germany (GS Mark), Japan, South Korea, Taiwan

Summary of Changes

Date	Version History	Action	Description of Change:
01-Jun-2015	From Version 6 to 7	Changed	Changes were made throughout the QuickSpecs.
03-Apr-2015	From Version 5 to 6	Changed	Changes made to the What´s New, Family Info and Config Info. Sections.
30-Mar-2015	From version 4 to 5	Changed	SKUs descriptions updated, Obsolete SKUs removed
		Added	Introducing support for 12G SFF and LFF w Hard Disk Drives
01-Dec-2014	From Version 3 to 4	Changed	Changes were made throughout the QuickSpecs.
29-Sep-2014	From Version 2 to 3	Changed	Changes were made throughout the QuickSpecs
14-Apr-2014	From Version 1 to 2	Changed	Corrected the HTML Changes document.

© Copyright 2015 Hewlett-Packard Development Company, L.P.

The information contained herein is subject to change without notice.

Microsoft and Windows NT are US registered trademarks of Microsoft Corporation. Intel is a US registered trademark of Intel Corporation. Unix is a registered trademark of The Open Group.

The only warranties for HP products and services are set forth in the express warranty statements accompanying such products and services. Nothing herein should be construed as constituting an additional warranty. HP shall not be liable for technical or editorial errors or omissions contained herein.